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Biological notes on *Tineovertex melanochrysa* (Meyrick, 1911) (Lepidoptera, Tineidae) in Japan

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Abstract *Tineovertex melanochrysa* (Meyrick, 1911) is a small diurnal tineid moth, known from India, Taiwan and Japan. The female of this species has a characteristic piercing ovipositor, which is similar to that of Incurvarioid moths, but the ovipositing behavior has not been known. In July 2007, at Mt Mikusa, Osaka, Japan, we observed that the female inserted eggs into tissue of a fern, *Blechnum nipponicum* (Kunze) Makino (Blechnaceae) and the larvae fed on dead plant materials on the ground after making a portable case. Biological notes on the immature stages and distributional records in Japan are given.

Key words *Tineovertex melanochrysa*, Tineidae, *Blechnum nipponicum* (Kunze) Makino, biology, Japan.

Introduction

Tinea melanochrysa Meyrick, 1911 was described based on specimens from Khasi Hills, NE India. Moriuti (1982) established the genus *Tineovertex* with it as the type species based on the peculiar male and female genitalia and only noted that the adults occur in forest covered with ferns. According to Dr T. Saito (*pers. comm.*) and Sakai (2002), the larvae of *T. melanochrysa* feed on dead leaves on the ground in Japan and construct a flat-oblong portable case. Robinson and Nielsen (1993) noted that they are aware of eight additional Oriental species (of which four are named). Huang *et al.* (2007) described one new species and one newly recorded species from South China and considered that the larval feeding habits of *Tineovertex* species are similar to those of Adelidae, because the female has an ovipositor of a piercing type and the larvae feed on dead leaves. However, the ovipositing behavior and feeding habit of younger larvae of *Tineovertex* species still remained unclear. In this paper, biological notes on *T. melanochrysa* including ovipositing behavior, feeding habits of the immature stages, and distributions are given.

Materials and methods

Field observations were carried out during May and October 2007 (May 15, June 6, July 5, July 18, August 7, August 29, October 18) at the coppice (*ca* 450 m asl.) of Mt Mikusa (Osaka Pref., Japan), which mainly supports some deciduous *Quercus* spcecies. Behavior of *Tineovertex melanochrysa* was observed around noon (11: 00–13: 00 hrs) in the field on July 18. Ten females were obtained for observing ovipositing behavior. They were kept individually in 430 m*l* transparent plastic cups (129 mm in top diameter and 60 mm in depth) in the laboratory with the host-plant leaf, and the ovipositing behavior was observed during July 19–20.

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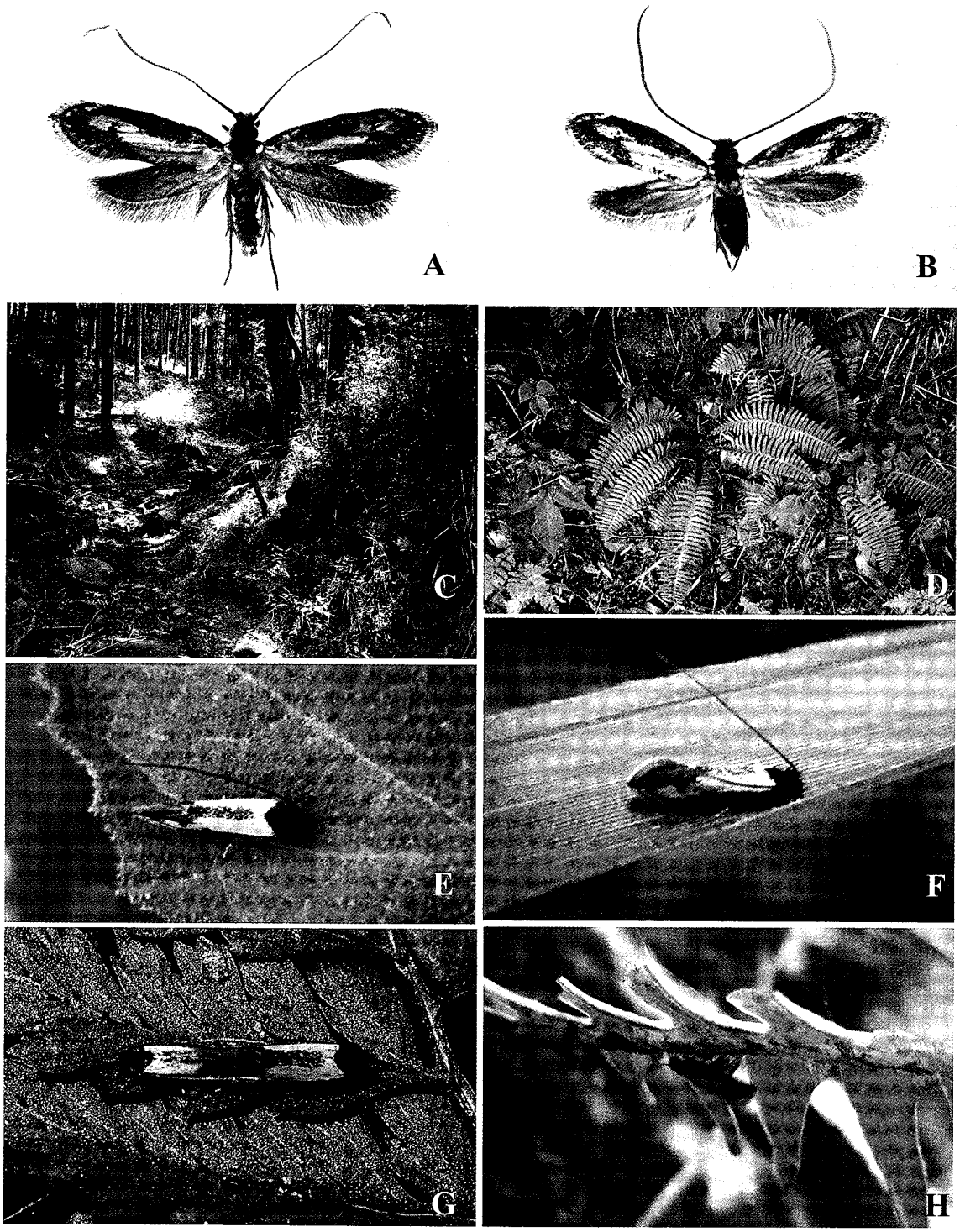

Fig. 1. Adults and the habitat of *Tineovertex melanochrysa* (Meyrick, 1911). A. Male. B. Female. C. Habitat. D. The plant for ovipositing, *Blechnum nipponicum* (Blechnaceae). E, F. An adult perching on a plant. G. Mating pair. H. A female laying egg into the fern.

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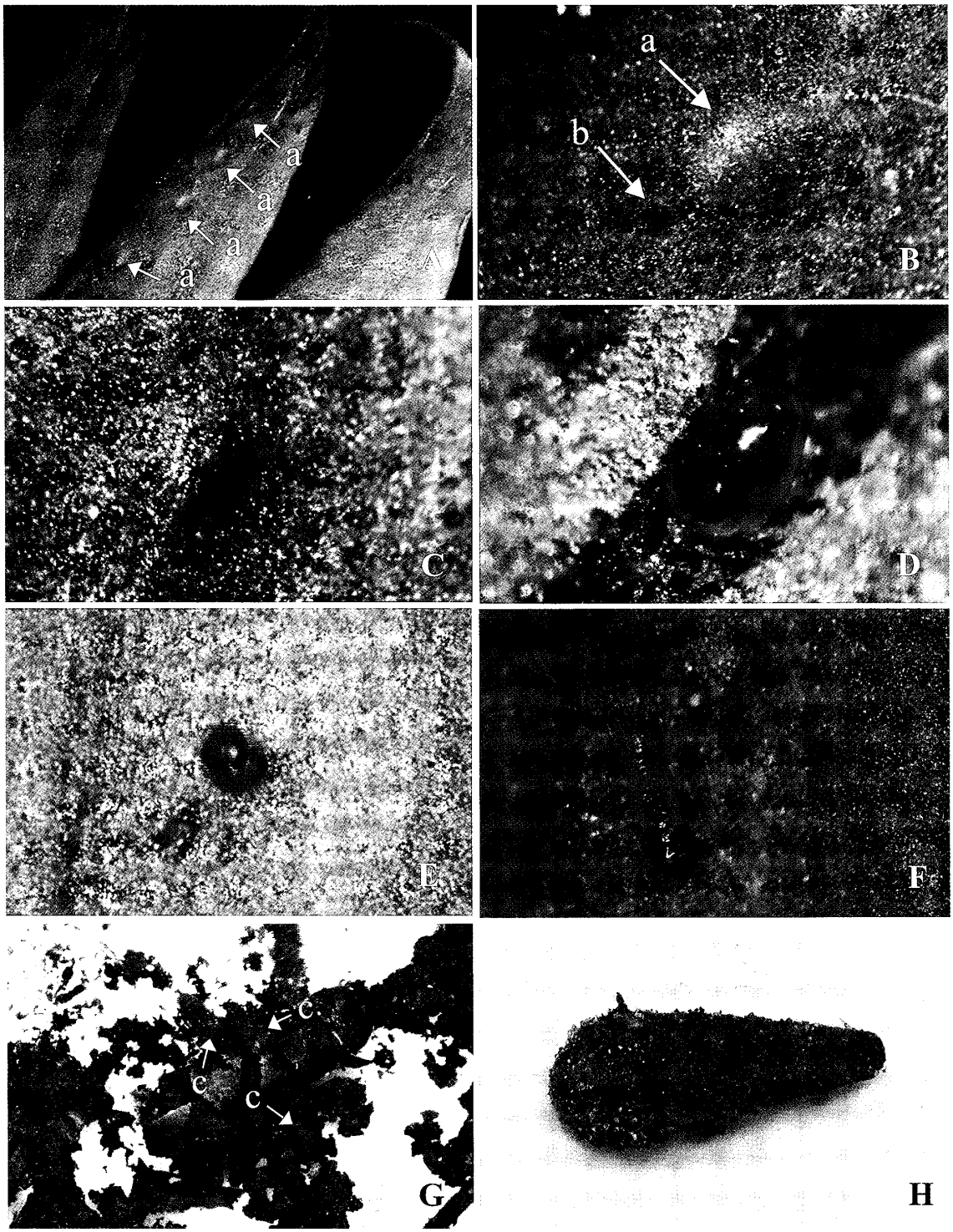

Fig. 2. Imature stages of *Tineovertex melanochrysa* (Meyrick, 1911). A. Eggs laid into tissue of the host plant (arrow 'a' indicates position of egg). B. *Ditto* (arrow 'b' indicates a hole made by female piercing ovipositor). C–D. *Ditto*, epidermis of the fern was cut to see egg. E. First instar larva, slipping out from the tissue. F. *Ditto*, just before fall into the ground. G. *Ditto* (arrow 'c' indicates case made by first instar larva). H. Portable case made by middle instar larva.

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Distributions of the species in Japan were checked based on the specimens preserved in Entomological Laboratory, Osaka Prefecture University, Osaka (OPU) and Department of Zoology, National Science Museum, Tokyo (NSMT). Unless otherwise mentioned, all the examined specimens are in OPU.

Tineovertex melanochrysa (Meyrick, 1911) (Figs 1–2)

Tinea melanochrysa Meyrick, 1911: 120 (type locality: Khasi Hills, NE India).
Tineovertex melanochryseus: Moriuti, 1982: 167; Davis, 1992: 63; Sakai, 2002: 69.
Tineovertex melanochrysa: Robinson & Tuck, 1996: 10; Wang *et al.*, 2000: 34; Huang *et al.*, 2007: 39.

Material examined. [Japan] HONSHU. Osaka Pref.: Minoo: 1 ♀, 1. VII. 1971, (T. Saito); 5 ♂ 2 ♀, 2–10. VII. 1979, (T. Saito); 2 ♂ 2 ♀, 10. VII. 1979, (K. Yasuda); 2 ♂ 3 ♀, 3. VII. 1980, (T. Saito); 1 ♀, 5. VII. 1982, (T. Saito). 1 ♀, Aokaiyama, Toyono-cho, 25. VI. 1998, (T. Saito); Mt Mikusayama: 10 ♂ 6 ♀, 15. VII. 1993, (T. Hirowatari); 8 ♂ 6 ♀, 5. VII. 2007, (T. Hirowatari, S. Kobayashi, A. Nobuoka); 20 ♂ 16 ♀, 18. VII. 2007, (G. H. Huang, T. Hirowatari, S. Kobayashi, A. Nobuoka). SHIKOKU. Kochi Pref.: 4 ♂ 3 ♀, Asizurimisaki, 14. VI. 1964, (S. Moriuti). Ehime Pref.: 1 ♀ , Sugitate, 27. VI. 1956, (M. Okada). KYUSHU. Fukuoka Pref.: 1 ♂, Mt Sarakura, Yahata, 19. VII. 1961, (T. Kawamura); Mt Hiko-san: 1 ♂, 23. VII. 1956, (H. Kuroko); 1 ♀, 27. VII. 1954, (H. Kuroko). Kagoshima Pref.: 1 ♀, Ôyamada, Kajiki-cho, 26. VI. 1984, (T. Nakahara). RYUKYU. Ishigakijima Is.: Omotodake: 3 ♂, 2. V. 1978, (S. Moriuti); 2 ♂ 2 ♀, 2. V. 1978, (Y. Arita), NSMT; 1 ♀, 4. V. 1978, (Y. Arita), NSMT; 1 ♂, 4. V. 1978, (S. Moriuti); 1 ♂, 5. V. 1978, (S. Moriuti); 1 ♀, 2. IV. 1980, (K. Yasuda); 2 ♂, 6. IV. 2001, (B. W. Lee). 1 ♀, Banna, 3. V. 1978, (S. Moriuti); 1 ♂, Nagura, 3. V. 1978, (S. Moriuti); 1 ♂, Bannakoen, 7. IV. 2001, light trap, (T. Ueda, N. H. Ahn, B. W. Lee, Y. Miyamoto, K. Yamada). Iriomote Is.: 1 ♂, Nakamagawa, 11. X. 1992, (T. Ueda); 1 ♂, Uehara, Taketomi-tyo, larva in the portable case collected on 4. X. 2001, emergence on 9. I. 2002 with dead leaf as the host (T. Saito); 2 ♀, Shirahama, 29. XI. 1996, (T. Ueda). Yonakuni Is.: 3 ♂ 1 ♀, Mt Urabe-dake, 13. V. 1963, (Y. Arita), NSMT.

Distribution. Japan: Honshu (Osaka Pref.), Shikoku (Kochi and Ehime Prefs.), Kyushu (Fukuoka and Kagoshima Prefs.), Ryukyus (Ishigaki Is., Iriomote Is., Yonakuni Is.); Taiwan, India.

Biology. In the field, some adults of *Tineovertex melanochrysa* (Fig. 1A, B) were observed flying near the ground along a mountain pass at Mt Mikusa on July 5, 2007 (Fig. 1C). On July 18, 2007, at the same site, a much higher number of moths, about 50 individuals (per 50 m along the pass) were observed flying or perching on leaves of short shrubs or ferns (Figs 1D–F). During the daytime around noon, a mating pair was found perching on a leaf of a fern (Fig. 1G). A female of *T. melanochrysa* was observed ovipositing in a fern *Blechnum nipponicum* (Kunze) Makino (Blechnaceae) from the underside of the leaf (Fig. 1H). The female remained on the leaf about 30 seconds and repeated ovipositing by bending its abdomen, by changing position several times. However, the eggs were not visible externally. This indicated that the female oviposits several eggs continuously and the eggs are laid into the tissue of the fern.

In the laboratory, it was confirmed that the female of *T. melanochrysa* laid several eggs separately into the tissue of *B. nipponicum* (Fig. 2A). Immediately after oviposition, the egg was creamy white, ellipsoidal (diameter 0.6 mm in length, 0.4 mm in width), with very thin chorion. As embryonic growth progressed, the egg became transparent and a pharate first instar larva was visible just before hatching (Fig. 2C, D). The newly hatched first instar larvae slipped out from the tissue (Fig. 2E, F), and fell to the ground without feeding on the plant. After falling to the ground, the larva started to make a portable case with silk and

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grains of sand (with anterior extremity of case about twice as broad as posterior extremity) (Fig. 2G) and fed on dead leaves or other plant material. Thus, it was confirmed that the life history of this species resembles that of the family Adelidae. On May 15, June 6, and August 7 and 29, no adults were seen at Mt Mikusa. On October 18, we collected the larval cases in the field (Fig. 2H). They were found on the ground near the host plant, and estimated to be middle instar; the case is 7.6–8.0 mm in length; the case of mature larva collected by Dr T. Saito in the Ryukyus is 11.5 mm in length. Sakai (2002) reported that the larvae were collected from March to May in Kyushu. Thus, the species overwinters with middle (3–4) instar larvae in the main islands of Japan. According to the specimen label data, adults appear June–July in Honshu, Shikoku, Kyushu, and April–May and October–November in the Ryukyus. Judging from field observations and specimen label data, the species is univoltine in Honshu, Shikoku, Kyushu, and bivoltine (at least two generations in a year) in the Ryukyus.

Remarks. As Moriuti (1982) and Huang *et al.* (2007) illustrated, the female genitalia of the genus *Tineovertex* are characteristic in having long apophyses, an ovipositor with serrate piercing apex, and the eighth abdominal tergum with a median keel. In the family Tineidae, a similar type of female genitalia is known in the monobasic genus *Ischnuridia* Sauber, 1902 from the Philippines, the Indo-Australian genus *Ectropoceros* Diakonoff, 1955 and a few other genera (Davis & Heppner, 1987; Robinson & Nielsen, 1993). According to G. S. Robinson (*pers. comm.*), a piercing ovipositor and association with ferns occurs also in Teichobiinae and some Hapsiferinae, which indicates that it has evolved independently several times in Tineidae. Further studies are required on the biology and phylogenetic relationships of these genera.

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References

Davis, D. R., 1992. Tineidae. *In* Heppner, J. B. & H. Inoue (Eds), Checklist. *Lepid. Taiwan* **1** (2): 63–65. Scientific Publishers, Taiwan.

Davis, D. R. & J. B. Heppner, 1987. New discoveries concerning *Ischnuridia*, a remarkable genus of Indo-Australian Tineidae (Lepidoptera). *Tinea* **12** (Suppl.): 145–151.

Huang, G.-H., Hirowatari, T. & M. Wang, 2007. Taxonomic notes on the genus *Tineovertex* Moriuti (Insecta, Lepidoptera, Tineidae) with description of a new species. *Zootaxa* **1637**: 37–46.

Meyrick, E., 1911. Descriptions of Indian Micro-Lepidoptera. *J. Bombay nat. Hist. Soc.* **21**: 104–131.

Moriuti, S., 1982. Tineidae. *In*: Inoue, H. *et al.*, *Moths of Japan* **1**: 162–171, **2**: 1–552. Kodansha, Tokyo. (In Japanese).

Robinson, G. S. & E. S. Nielsen, 1993. Tineid genera of Australia (Lepidoptera). *Monogr. Aust. Lepid.* **2**: i–xvi, 1–344. CSIRO Publications, Melborune.

Robinson, G. S. & K. R. Tuck, 1996. A revisionary checklist of the Tineidae (Lepidoptera) of the Oriental Region. *Occ. Pap. syst. Ent.* **9**: 1–29.

Sakai, M., 2002. *Systematic Study of the Family Tineidae of Japan* (Insecta: Lepidoptera). Unpublished Ph. D. Kyushu University, Japan.

Wang, H. Y., Park, K. T. & Y. Arita, 2000. Microlepidoptera. *Guide Book of Insects in Taiwan* (20): 1–252.

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Shu Shin Books, Taipei. (In Chinese).

摘　　要

クロスジキヒロズコガ (ヒロズコガ科) に関する生物学的知見 (黄　国華・小林茂樹・広渡俊哉)

クロスジキヒロズコガ *Tineovertex melanochrysa* (Meyrick, 1911) は, 小型のヒロズコガ科の一種で, 本州, 四国, 九州, 国外では, 台湾, インドに分布することが知られている. 本種の成虫は昼間に活動し, 発生時期には比較的多くの個体が見られる. 本種の雌交尾器は特異で, 第8背板にメディアンキール (median keel) をもつ, 産卵器の先端が鋸歯状となるなど, マガリガ上科にみられるような「突き刺すタイプ」となっている. この特異な形態から, 本種が生きた植物の組織内に卵を産み込むのではないかと推定されていたが, 実際にどのような産卵習性をもつかは不明であった. また, 幼生期の生態などについても不明な点が多かった. 著者らは, 2007年7月上-中旬に大阪府能勢町三草山, および採集した成虫の行動を実験室で観察した. 野外での観察の結果, 雌はシダ植物のシシガシラ *Blechnum nipponicum* (Kunze) Makino の葉の裏面に産卵するのを観察することができた. また, 室内での観察により, 卵は成葉の複葉裏面の組織内に1個ずつ複数個が産み込まれること, 孵化後に組織から脱出した幼虫は植物体を食べずに地面に落下し, ポータブルケースを作って, 枯れ葉などを食べることが明らかになった. 本種の生活史は原始的なヒゲナガガ科とよく似ており, 生きた植物に産卵する習性をもつことはヒロズコガ科では例外的である. 世界的に見るとフィリピンに分布する *Ischnuridia* Sauber, 1902 とインド-オーストラリアに分布する *Ectropoceros* Diakonoff, 1955 などの属の種が類似した雌交尾器の形態をしていることが知られているが, 生態に関する情報は少なく, これらが単系統群であるかどうかについても今後の検討が必要である.

本種はMeyrick (1911) によってインド産の標本をもとに記載され, その後, 台湾と日本から記録された. 大阪府大の所蔵標本を中心に調査した結果, 日本国内では以下の府県での分布が確認された. 成虫が採集されたデータによると, 本州・四国・九州では年1回, 琉球列島 (八重山諸島) では少なくとも年2回発生し, 近畿では, 3-4齢幼虫で越冬すると考えられる.

分布: 本州 (大阪府), 四国 (高知県, 愛媛県), 九州 (福岡県, 鹿児島県), 琉球列島 (石垣島, 西表島, 与那国島); 台湾; インド.

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